BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

In the matter of the adoption of New Rules I through IV pertaining to standards for electrical conductivity and sodium adsorption ratio and classifications for constructed coal bed methane water holding ponds, and the amendment of ARM 17.30.602, 17.30.706 and 17.30.715 pertaining to definitions for water quality standards, informational requirements for nondegradation significance/ authorization review and nonsignificance criteria	NOTICE OF ADOPTION AND AMENDMENT (WATER QUALITY)

TO: All Concerned Persons

1. On August 29, 2002, the Board of Environmental Review published MAR Notice No. 17-171 regarding a notice of public hearing regarding the proposed adoption and amendment of the above-stated rules at page 2269, 2002 Montana Administrative Register, issue number 16. On December 26, 2002, the Board of Environmental Review published MAR Notice No. 17-187 regarding an amended notice of public hearing on the proposed adoption and amendment of the above-stated rules at page 3489, 2002 Montana Administrative Register, issue number 24. MAR Notice Nos. 17-171 and 17-187 were part of the same rulemaking proceeding.

2. The Board did not adopt New Rule I or the proposed amendments of ARM 17.30.715 from MAR Notice No. 17-171 or Alternative I of New Rule IV from MAR Notice No. 17-187. The Board deferred consideration of New Rules II and III and the proposed amendment of ARM 17.30.706 until its June 6, 2003 regularly scheduled meeting. The Board has adopted Alternative II of New Rule IV (17.30.670) and amended ARM 17.30.602 as proposed, but with the following changes from the amended notice, stricken matter interlined, new matter underlined:

ALTERNATIVE II

Rule IV (17.30.670) NUMERIC STANDARDS FOR ELECTRICAL CONDUCTIVITY (EC) AND SODIUM ADSORPTION RATIO (SAR)

(1) remains as proposed.

(2) ~~Except as provided in [New Rule III], the~~ The numeric standards for electrical conductivity (EC) and sodium adsorption ratio (SAR) for the mainstems of Rosebud Creek, the

Tongue, Powder, and Little Powder rivers from November 1 through March 1 are as follows:

(a) for Rosebud Creek and the Tongue River, the monthly average numeric water quality standard for EC is ~~2000~~ 1500 µS/cm ~~[or an alternative value in the range of 1000 through 2000 µS/cm]~~ and no sample may exceed an EC value of 2500 µS/cm. ~~and the~~ The monthly average numeric water quality standard for SAR is 5.0 ~~[or an alternative value in the range of 3.0 through 5.0]~~ and and no sample may exceed an SAR value of 7.5; and

(b) for the Powder River and the Little Powder River, the monthly average numeric water quality standard for EC is 2500 µS/cm and no sample may exceed an EC value of 2500 µS/cm. ~~and the~~ The monthly average numeric water quality standard for SAR is 6.5 ~~[or an alternative value in the range of 6.0 through 7.5]~~ and no sample may exceed an SAR value of 9.75.

(3) ~~Except as provided in [New Rule III], the~~ The numeric standards for EC and SAR for the mainstems of Rosebud Creek, the Tongue, Powder, and Little Powder rivers from March 2 through October 31 are as follows:

(a) for Rosebud Creek and the Tongue River, the monthly average numeric water quality standard for EC is 1000 µS/cm ~~[or an alternative value in the range of 1000 through 1500 µS/cm]~~ and no sample may exceed an EC value of 1500 µS/cm. ~~and the~~ The monthly average numeric water quality standard for SAR is ~~3.5~~ 3.0 ~~[or an alternative value in the range of 3.0 through 5.0]~~ and no sample may exceed an SAR value of 4.5; and

(b) for the Powder River and Little Powder River, the monthly average numeric water quality standard for EC is 2000 µS/cm ~~[or an alternative value in the range of 1600 through 2000 µS/cm]~~ and no sample may exceed an EC value of 2500 µS/cm. ~~and the~~ The monthly average numeric water quality standard for SAR is 5.0 ~~[or an alternative value in the range of 4.0 through 6.0]~~ and no sample may exceed an SAR value of 7.5.

(4) ~~Except as provided in [New Rule III], for~~ For all tributaries and other surface waters in the Rosebud Creek, Tongue, Powder, and Little Powder river watersheds, the monthly average numeric water quality standard for EC is 500 µS/cm ~~[or an alternative value in the range of 500 through 2500 µS/cm]~~ and no sample may exceed an EC value of 500 µS/cm. ~~and the~~ The monthly average numeric water quality standard for SAR from March 2 through October 31 is ~~5.0~~ 3.0 ~~[or an alternative value in the range of 3.0 through 7.5]~~ and no sample may exceed an SAR value of 4.5. The monthly average numeric water quality standard for SAR from November 1 through March 1 is 5.0 and no sample may exceed an SAR value of 7.5.

(5) ~~All of the standards listed in (2) through (4) apply as an average value for each month [or as an instantaneous value].~~ For the Tongue River Reservoir, the monthly average numeric water quality standard for EC is 1000 µS/cm and no sample may exceed an EC value of 1500 µS/cm. The monthly average numeric water quality standard for SAR is 3.0 and no sample may exceed an SAR value of 4.5.

(6) through (8) remain as proposed.

17.30.602 DEFINITIONS (1) through (8) remain as proposed.

(9) "Electrical conductivity (EC)" means the ability of water to conduct an electrical current at 25°C. The electrical conductivity of water represents the amount of total dissolved ~~salts~~ solids in the water and is expressed as microSiemens/centimeter (µS/cm) or micromhos/centimeter (µmhos/cm) or equivalent units and is corrected to 25°C.

(10) through (32) remain as proposed.

3. The following comments were received and appear with the Board's responses:

Response to Comments on MAR Notice No. 17-171

COMMENT NO. 1: Several commentors recommended retaining the existing narrative water quality standards that apply to Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) and not adopt numeric EC and SAR standards. These commentors stated that the proposed numeric standards are not consistent with scientific information regarding irrigation water quality and potential effects on Montana soils and crops. This is illustrated by the inability of the Department to develop clear, concise and consistent standards as demonstrated by the numerous changes that have been made during the development of the proposed standards.

RESPONSE: The process of developing water quality standards for EC and SAR in the Powder River Basin has been underway for more than two years. During that time, the Department reviewed previously existing water quality data, collected additional data and reviewed available information about crops and irrigation practices in the Basin. Initially, draft standards were prepared and distributed for comment to the agricultural community, environmental representatives and the coal bed methane (CBM) industry. Based on the comments and data received, the Department continued to revise its initial proposal as part of the process of developing scientifically defensible standards. The number of revisions during the development of the proposed standards indicates that the Department was engaged in an open and responsive process.

At this time, the Board believes that there is sufficient information about the effect of irrigation water salinity and SAR to establish water quality standards that are protective of existing and future beneficial uses. The U.S. Environmental Protection Agency submitted comments in support of the Board's position by stating: "Although the issues are complex, the science for some key factors imperfect, and the data on existing conditions incomplete, we believe the existing information is sufficient to support adoption of appropriate and protective standards now...." Despite the various changes to the rules that are being made in response

to comments, the Board believes that there is sufficient information to adopt numeric standards that are protective of designated uses. Given that numeric standards are necessary to clearly delineate an enforceable limit that is consistently applied by various permit writers, the Board does not agree that retaining the existing narrative standard is appropriate.

COMMENT NO. 2: Several commentors stated that the numeric standards for the Powder River are too low, because the natural quality of the River exceeds the proposed standards.

RESPONSE: The Board agrees. The EC standard for the Powder River during the irrigation season will be raised from 1900, as originally proposed, to 2000 µS/cm. For the nonirrigation season, the EC standard will be raised from 2000, as originally proposed, to 2500 µS/cm. In addition, the SAR standard will be 6.5 for the nonirrigation season. These modifications more nearly reflect natural conditions and will not impact irrigated agriculture.

COMMENT NO. 3: The formula for deriving a SAR standard for the Tongue River and Rosebud Creek during the irrigation season should be eliminated. The change is recommended after a review of the "Hanson" diagram. The diagram was the basis for the formula in MAR Notice No. 17-171 (SAR = (EC X 0.0071) – 2.475) that relates "permissible" SAR levels to EC. The review revealed that the diagram was incorrectly copied from the original scientific papers. Using the original papers the correct formula is SAR = (EC X 0.0067) - 3.345. Rather than modify the rules to include the correct formula, it is recommended that the formula be eliminated from the rules for the following reasons:

(1) For the Tongue River and Rosebud Creek, the minimum EC to which the formula was applied in MAR Notice No. 17-171 was 350 µS/cm. Using the formula resulted in a water quality standard for SAR of 0.5. However, long-term irrigation of comparable soils in the Yellowstone Valley using water with an EC less than 500 µS/cm and a SAR of 2 has not caused noticeable damage to soils. If the correct formula is used, a SAR of 2 corresponds to an EC value of approximately 800 µS/cm. Thus, the formula could only be used for EC values between 800 and 1000 µS/cm (the EC standard). Due to the limited applicability of the formula to these streams, the uncertainty of the formula values, and the fact that eliminating the formula greatly simplifies the rules, the formula should not be used for the Tongue River and Rosebud Creek.

(2) For the Powder and Little Powder Rivers, the EC is nearly always above 1240 µS/cm. At EC values greater than 1240 µS/cm, the formula gives SAR values greater than 5. Since the maximum SAR irrigation standard for these Rivers is set at 5, the formula would serve no purpose for these streams.

(3) For the tributaries, the EC standard of 500 µS/cm and the use of the formula would result in a SAR limit of 0.005. This value is well below a SAR of 2, which is not harmful in the Yellowstone Valley. Thus the formula should not be used.

RESPONSE: The Board agrees. Rather than use the formula, the Board is adopting specific SAR values for the various streams and rivers under consideration.

COMMENT NO. 4: Even though the Department concedes that EC and SAR are "harmful" parameters, the proposed rule treats these parameters differently from all other harmful parameters by exempting them from the nondegradation policy. The proposal exempts EC and SAR by providing a nonsignificance threshold that is the same as the proposed numeric water quality standards for EC and SAR. The Board should reject this proposal because it will not pass strict scrutiny by the courts and is therefore unconstitutional. Instead, the Board should adopt the irrigator's proposal that would set the nonsignificance threshold at 50% of the applicable standard, which is the threshold for all other harmful parameters.

Another commentor argued that EC and SAR should be designated as "toxic" for purposes of establishing a 15% nonsignificance threshold for nondegradation review.

RESPONSE: The Department has not conceded that EC and SAR should be classified as "harmful." Moreover, the Board does not agree that the rule should be changed to define EC and SAR as either "harmful" or "toxic." In MAR Notice No. 17-171, the Board explained that, given the natural fluctuations of EC and SAR in the Tongue and Powder River Basins, which often result in exceedances of the proposed numeric standards, the policy of maintaining existing "high quality" for these parameters is not justified. Regardless of the numeric threshold that could be imposed by the adoption of a 50% or 10% threshold, those thresholds will not prevent EC and SAR from naturally degrading water quality to the point where the numeric standards are exceeded. The Board also explained that imposing a numeric threshold based upon a percentage of the assimilative capacity would be virtually impossible to comply with or enforce. Given that slight changes in EC and SAR are extremely difficult to measure, a nonsignificance threshold based upon a percentage of the assimilative capacity would require continuous in-stream monitoring in order to distinguish between natural degradation and nonsignificant changes resulting from discharges. The impracticality of enforcing a numeric nondegradation threshold for these parameters argues persuasively against the adoption of such thresholds.

Based on the reasons given above, the Board does not believe that the narrative nonsignificance thresholds violate the Water Quality Act or the Constitution.

COMMENT NO. 5: Adoption of any numerical standards for EC and SAR would eliminate the potential for any discharge of CBM water.

RESPONSE: The revised rules would not eliminate the potential for CBM discharges. According to analyses performed by DEQ staff, the revised rules would allow for at least several thousand acre feet of CBM discharges to the Powder River without violating standards, even after the nondegradation threshold for flow is applied (i.e. 15% of the mean monthly flow). For the Tongue River, there could be from 10,000 to 15,000 acre feet of CBM discharges. Both of these numbers are based on the assumptions that discharge limitations will be based on the monthly 90th percentile flows and that the nondegradation thresholds for other parameters will not be limiting.

COMMENT NO. 6: Adoption of numerical standards for EC and SAR would potentially eliminate the allocation of any assimilative capacity to Wyoming.

RESPONSE: The purpose of water quality standards is not to allocate assimilative capacity, but to protect the designated uses of a water body. See 40 C.F.R. § 131.2 and 131.11. For this reason, the water quality standards being adopted by the Board do not allocate assimilative capacity among tribal lands, Montana, or the state of Wyoming. Rather, the standards being adopted will protect agricultural uses within the state, as well as the other designated uses of those state waters. If it becomes necessary to apportion the assimilative capacity of the water bodies for EC or SAR between the states, that process would likely take place in the context of an interstate total maximum daily load (TMDL) or an interstate agreement under the federal Clean Water Act (CWA).

COMMENT NO. 7: The proposed numerical standards for EC and SAR would create compliance problems for all current and future discharges.

RESPONSE: The numeric standards will not "create" compliance problems because, regardless of the type of water quality standard used (numeric or narrative), the designated uses of the water body require protection based upon compliance with an appropriate MPDES permit limit. The only difference between using the numeric standards rather than the existing narrative standard is that the precise level of protection would no longer be subject to differing interpretations in the context of future permitting decisions and enforcement actions.

Moreover, compliance with the numeric standards should not be a problem for new point sources, since no permit may be issued unless the department is assured that the permit limits can be met. See ARM 17.30.1311(1). For existing sources, which are primarily municipalities, the adoption of EC and SAR standards should have little or no effect, since those sources do not discharge large volumes of EC and SAR. In terms of

nonpoint sources and irrigation return flows, those sources are not subject to permit requirements so that compliance with permit limits will not be a problem. See ARM 17.30.1310. However, nonpoint sources and irrigation return flows are subject to compliance with water quality standards, regardless of whether those standards are numeric or narrative.

COMMENT NO. 8: Adopting the proposed numeric standards would require listing the streams in the area as impaired and developing a total maximum daily load (TMDL) for all of the streams.

RESPONSE: The adoption of numeric standards for EC and SAR will not mandate the listing of streams as impaired, but will serve as a basis for determining their impairment status. The mere fact that the waters in these Rivers may exceed the numeric standards is not the only factor considered in making this determination. The determination of whether or not a water body is impaired requires an extensive review of water quality information and an assessment of the sources and causes of pollution. If the quality of a water body does not meet one or more standards because of natural conditions, the water is not listed as impaired and does not need a TMDL. In fact, several water body segments in the Basin were listed as impaired and in need of a TMDL based on an interpretation of the narrative standards for salinity. Some of those waters were removed in the year 2000 list due to a lack of sufficient, credible data to support their listing. As a result, additional water body assessments have been conducted and, based upon the outcome of those assessments, TMDLs may be determined to be necessary. If a TMDL is necessary, the numeric standards being adopted for EC and SAR will facilitate the determination of appropriate load and waste load allocations during TMDL development.

COMMENT NO. 9: The proposal is not stringent enough during the nonirrigation season.

RESPONSE: The Board's proposed revisions to the EC and SAR standards will protect the sensitive crops grown in the Powder River Basin during the nonirrigation season. The standards during the nonirrigation season are somewhat less stringent but are believed to be protective of riparian vegetation and floodplain areas that could be flooded during the winter because of ice jams. The Board also believes that the proposed standards are protective of all aquatic life (fish as well as invertebrates). During some parts of the year, summer or winter, the water quality data show that the proposed standards have been exceeded and no information has been found that suggests the aquatic life has been impaired during those excursions.

COMMENT NO. 10: The proposed numeric standards should be modified because they do not include March during the irrigation season. Irrigation during March, especially on the tributaries, is common in the affected areas.

RESPONSE: The Board agrees and is modifying the rules to include the month of March in the irrigation season.

COMMENT NO. 11: The proposed standards will not protect uses in the Basin or downstream in the Yellowstone Valley. The standards should be set so that no increases in EC or SAR are allowed.

RESPONSE: The Board believes that the numeric standards will protect all beneficial uses of the Rivers and that implementation of the standards under the existing permit system will ensure that downstream uses will be protected. This belief is based on the information, data, and analyses contained in the paper titled Technical Basis for Draft EC and SAR Standards, Montana Department of Environmental Quality, July 2002, which is the basis for the standards, and modifications to the standards made in response to new information submitted during the comment period.

The Board also believes that the nondegradation requirements in the rules are adequate to protect the waters in the Basin during the periods when the quality of those waters is better than necessary to protect the designated uses (i.e., "high quality"). An absolute ban on any increase of EC and SAR is unnecessarily stringent since "high quality" waters by definition have some assimilative capacity for increases in a parameter while still fully supporting uses.

COMMENT NO. 12: Montana's existing narrative standards coupled with specific discharge limits based on guidelines are more flexible than numeric standards, and fully protect beneficial uses. According to statements of Wyoming's Department of Environmental Quality, the use of narrative standards using implementation guidance for establishing permit limits for coal bed natural gas discharges has been functioning well in Wyoming.

RESPONSE: The Board believes that numeric standards will simplify the permitting process and aid in maintaining a consistent approach to permitting discharges from CBM wells. It is also the Board's opinion that numeric standards are necessary to protect irrigated agriculture in the Powder River Basin from any impacts that may occur from such discharges. This belief is based on the information, data, and analyses contained in the paper titled Technical Basis for Draft EC and SAR Standards, Montana Department of Environmental Quality, July 2002, which is the basis for the standards, and modifications to the standards made in response to new information submitted during the comment period. In addition, without numeric standards, permits may be issued that are not protective of designated uses, due to individual interpretations of "flexible" guidelines.

The suggestion that guidelines be used for interpreting the existing narrative standards would likely require rulemaking under the Montana Administrative Procedure Act before the Department could apply those guidelines in its permitting decisions.

COMMENT NO. 13: Numeric standards should not be adopted until the development of a TMDL work is completed.

RESPONSE: The adoption of numeric standards by the Board will assist the Department in determining whether or not the Tongue and Powder Rivers are in fact impaired and in need of a TMDL. Since the purpose of a TMDL is to ensure that water quality standards are being met, adopting the numeric standards is the logical first step in this process. The numeric standards should facilitate the TMDL process by identifying the appropriate level of water quality that must be maintained.

COMMENT NO. 14: One commentor stated that Montana's Constitution requires that pollution be prevented and also requires that existing beneficial uses of water be recognized and confirmed. Specifically, the right to a "clean and healthful" environment provided in Article II, Section 3 and Article IX, Section 1, and the constitutional provision recognizing and confirming existing water rights in Article IX, Section 3 of Montana's Constitution, require the Board to adopt numeric standards that protect the existing water rights of the Tongue River Water Users' Association (TRWUA). In addition, another commentor argued that the contract between the state of Montana and the TRWUA for the use of water in the Tongue River Reservoir indicates that the water rights being served under that contract must be protected.

RESPONSE: The numeric standards proposed by the Board were specifically developed to protect existing irrigation practices. As such, the standards will protect the existing water rights of the TRWUA.

COMMENT NO. 15: One commentor stated that the proposed standards for EC and SAR would not apply to other rivers and streams in Montana, as suggested by the Department, but only apply to the streams and rivers identified in the rule.

RESPONSE: As noted by the commentor, the Board is adopting numeric standards for EC and SAR only for those streams and rivers identified in the rule proposals. The use of the standards by the Department, however, may result in the application of these standards in other streams and rivers in Montana. Specifically, since the majority of streams in Montana have narrative criteria for EC and SAR, the Department will use existing information including the information and process that was used to develop the numeric standards for the Powder River Basin as a basis for translating the narrative criteria during its permitting actions. As a result, the application of these numeric standards for EC and SAR to other streams and rivers with similar characteristics in Montana may occur.

COMMENT NO. 16: The proposed definition of electrical conductivity should be amended to delete the word "salts" from the phrase "total dissolved salts" and replace it with

"solids." The phrase "total dissolved solids" is more inclusive and more correctly describes the water's ability to conduct electricity. It also reflects the common usage of the term and the fact that all of the historical data is in terms of "total dissolved solids."

RESPONSE: The Board agrees and has amended the rule as shown above.

COMMENT NO. 17: Coal bed methane development will be a boom and bust business that will cause social and economic problems to local communities.

RESPONSE: The Board has no authority to control the "boom and bust" cycles created by industry. The Board's only authority over any industry is its authority to protect state waters through the adoption of water quality standards, nondegradation requirements, and permit requirements applicable to all industrial discharges.

COMMENT NO. 18: Coal bed methane water should be re-injected, both to protect the surface waters and to recharge the ground water.

RESPONSE: The Board's authority to adopt water quality standards under 75-5-301, MCA, does not include the authority to require re-injection as the only means of disposal for a discharge. Rather, the Board is authorized to adopt water quality standards that, in effect, will establish the maximum allowable change in water quality that is still protective of all existing and designated uses. After water quality standards are adopted, a discharger has the option of treating its discharge or re-injecting the discharge to ground water as a means to achieve compliance with the newly adopted standards.

COMMENT NO. 19: Discharges of coal bed methane water will result in harm to Pallid Sturgeon and Paddlefish.

RESPONSE: The Pallid Sturgeon and Paddlefish are residents of the Yellowstone River and do not reside in the streams and rivers under consideration. Due to the dilution of the Tongue River when it merges with the Yellowstone River, coal bed methane discharges into the Tongue River will not cause changes in water quality that would be harmful to Pallid Sturgeon or Paddlefish.

Response to Comments on MAR Notice No. 17-187

COMMENT NO. 20: Maximum or instantaneous standards are necessary, in addition to average monthly standards, in order to protect irrigated agriculture and aquatic life from the effects of values that are higher than the means. Specifically, maximum SAR standards are necessary in order to protect against rain-on-sodic-soil events and maximum EC standards are necessary to protect against osmotic shock.

RESPONSE: The Board agrees that, in addition to average monthly standards, maximum standards are necessary to protect

designated uses from values that exceed the mean monthly values. Accordingly, the Board is adopting maximum instantaneous standards. These standards will protect irrigated agriculture and aquatic life during short-term elevations in EC and SAR values.

COMMENT NO. 21: The EC and SAR standards for both the irrigation and nonirrigation seasons should be set to reflect the ambient values in the Powder and Little Powder Rivers since the ambient values in these Rivers are often above the standards that are being proposed. Setting standards that are less than the ambient levels will unnecessarily restrict discharges.

RESPONSE: The Board disagrees. Under federal law, water quality standards must be established at levels that protect designated uses, regardless of the ambient quality of the water. For this reason, the ambient condition of the water, whether high or low quality, is not relevant in determining the appropriate level of water quality that will fully protect uses. Although the irrigators on the Powder and Little Powder Rivers currently use water from these Rivers without harmful effects, they do not irrigate with average ambient quality water. Instead, they use the water only on those occasions when the quality of water is known to be of high enough quality that it will not damage their crops or soils.

The standards that the Board is adopting have been established in a manner that will protect agriculture and aquatic life uses from any increase in the levels of EC and SAR that may occur during periods of relatively good quality water.

See also response to Comment No. 30.

COMMENT NO. 22: If the water in the Tongue River Reservoir is allowed to reach the proposed nonirrigation season standards for EC and SAR at 2000 µS/cm and 5.0 respectively, then the water that is released from the Reservoir at the start of the irrigation season could exceed the irrigation season standards of 1000 µS/cm and 3.5.

RESPONSE: The Board agrees. Due to this concern, the Board is adopting the proposed irrigation season standards of the Tongue River as year-round standards for the Reservoir.

COMMENT NO. 23: The proposed nonirrigation season standard for EC at 2000 µS/cm for the Tongue River Reservoir is so high that it may reduce the abundance of zooplankton in the Reservoir. These organisms are the major food source for the fish in the Reservoir. We suggest that the standard be set at 1500 µS/cm or less.

RESPONSE: The Board agrees. The Board is adopting the irrigation season standards of the Tongue River as the year-round standard for the Tongue River Reservoir.

COMMENT NO. 24: The proposed nonirrigation season standard for EC at 2000 µS/cm for the Tongue River and Rosebud

Creek is so high that it may reduce the spawning or reproductive success of the fish in these streams. The nonirrigation season standard for EC should not exceed 1500 µS/cm for these streams in order to protect fish eggs and young fish during the first 30 to 60 days after the eggs hatch, which is the time they are most sensitive.

RESPONSE: The Board agrees. The Board concludes that the nonirrigation season standard for EC at 1500 µS/cm for the Tongue River and Rosebud Creek will not be harmful to fish or other aquatic life.

COMMENT NO. 25: The proposed EC standard of 500 µS/cm and a SAR limit of 5.0 on tributaries is neither reasonable nor reflective of ambient conditions. The standards for the tributaries should be the same as standards for the streams into which the tributaries flow.

RESPONSE: The Board disagrees and believes that a more protective standard for the tributaries is necessary based upon the following. Spreader dike systems, which are used along the tributaries, depend on leaching of salts that accumulate as a result of partial or full irrigation systems using waters whose EC and SAR are largely unknown. The data provided by Dr. Frank Sanders, of CBM Associates, demonstrate that levels of EC and SAR during individual runoff events in ephemeral tributaries have a high degree of temporal variability. Furthermore, both EC and SAR levels in the runoff can be quite high for considerable lengths of time. Data from Wyoming demonstrates that EC levels as high as 8000 µS/cm and SAR values up to 12 have occurred in ephemeral drainages. Any further increase in these parameters could pose a significant increase in the probability that irrigation with spreader dike systems along ephemeral tributaries is not sustainable.

Consequently, both the EC and SAR levels in runoff water in ephemeral tributaries must be maintained as low as possible, particularly since the levels of these water quality parameters are already high. The lowest possible EC is required to minimize the increase in soil salinity within the root zone that will occur between the episodic leaching events; the lowest possible SAR is required to facilitate the infiltration of the excess non-saline water needed for leaching during the episodic leaching event.

COMMENT NO. 26: The standard should be based on the median rather than the mean, because medians are not as sensitive to outliers which may be caused by unique and infrequently occurring conditions.

RESPONSE: The Board disagrees. The median should not be used for the very reason that it is not sensitive to "outliers" (values that are considerably different from most of the data). The use of medians instead of the means would allow increases in EC and SAR levels, which may affect agricultural use. The Board believes that limiting discharges based upon the mean is more protective of irrigation

sustainability than the median precisely because outliers will allow increases that may be harmful.

COMMENT NO. 27: The SAR standards for the Powder and Little Powder Rivers should be higher than 5.0 during the irrigation season because, according to the common infiltration risk threshold diagram, there is substantial assimilation capacity remaining in the SAR versus EC relationship under post 1990 conditions.

RESPONSE: The Board disagrees. The assimilative capacity based on the diagram does not take into account the impacts of rain. The impacts of rain are important because rain will lower the salinity of the surface soil more quickly than it will lower the SAR value. Consequently, what may be appropriate in regard to infiltration rates for certain soils, based on the EC and SAR of the irrigation water, can become harmful following rain. The average monthly SAR standard of 5.0 for the Powder River and the Little Powder River will limit the harmful effect of rain on assimilative capacity. Any SAR above 5.0 poses a risk to the sustainability of irrigated agriculture where rainfall occurs during planting season and during the early crop growth stages where crusting can prevent successful emergence of crop seedlings. It also poses significant risks in regard to reducing infiltration and increasing erosion and runoff on soils without full crop cover during the growing season and in the fall after annual crops are harvested.

COMMENT NO. 28: Any problem resulting from increased SAR can be effectively managed by surface dressing of various soil amendments such as gypsum or manure.

RESPONSE: The Board understands that the problems caused by modest increases in SAR could be overcome with various surface dressings. The costs to an individual farmer could range from $50.00 to $200.00 per acre. The Board does not agree that these costs should be born by the irrigators.

More importantly, 75-5-303(1), MCA, requires the protection of existing uses and the level of water quality necessary to protect those uses. Accordingly, the Board is statutorily constrained from allowing increases of SAR to the point that existing irrigation practices must be modified to accommodate lower water quality. Since the existing use of these waters does not require the application of "surface dressing," the Board will not allow increases of SAR that would require modifications to existing irrigation use.

COMMENT NO. 29: Soil crusting is an existing problem that may not be significantly reduced by the proposed SAR standard of 5.0.

RESPONSE: The Board agrees. This is one reason the average monthly water quality standard for SAR should not be higher than 5.0 during the irrigation season.

COMMENT NO. 30: Point source discharges should be allowed when such discharges contain better water quality than the ambient river conditions.

RESPONSE: The Board agrees. Section 75-5-306, MCA, generally provides that discharges are not required to treat their discharge to a purer condition than the natural conditions of the receiving water. Consequently, when the water quality standards are naturally exceeded, discharges which will not make the instream water quality worse are allowed.

COMMENT NO. 31: The nonirrigation season standards for Rosebud Creek should be the same as those for the irrigation season because much of the irrigation from Rosebud Creek is actually subirrigation where water is not applied to the soil surface but "wicks up" to the plant roots from a shallow aquifer that is recharged by water from the Creek.

RESPONSE: The Board disagrees. During the irrigation season, water is drawn up or "wicks" upward in the soils to replace water that is extracted by the plants or that evaporates from the soil surface. During the nonirrigation season, the plants are not extracting water and there is essentially no evaporation from the soil surface. Thus there is no "driving force" to move water up in the soil column.

In addition, during the nonirrigation season the water level in the creek is normally very low. In fact during this period zero flows are not uncommon. Due to the low levels of water in the stream channel, water tends to flow out of the soil and into the stream channel. Therefore, there is little chance that shallow aquifers will be recharged by water from Rosebud Creek during the nonirrigation season.

Finally, any potential increase in flow during the nonirrigation season resulting from CBM development is subject to Montana's nondegradation requirements. In order to be "nonsignificant" under Montana's rules implementing the nondegradation statutes, any increase in stream flow that would result from a "new or increased" discharge is limited to less than 15% of the mean monthly flow or less than 10% of the 7Q10 flow. Therefore, any potential increase in flow that would likely impact subirrigation would be limited based on a site-specific analysis during a nondegradation review of a proposed discharge.

COMMENT NO. 32: The most salt-sensitive crops grown in the Tongue River Basin are alfalfa and pinto beans, which do not begin to decrease in yield until the EC of the soil exceeds 2,000 µS/cm (measured in a saturated paste extract).

RESPONSE: The Board disagrees. The beans that are grown in the Tongue River area have a threshold salinity of 1,000 µS/cm.

This comment is likely based upon a North Dakota Extension Document (Managing Saline Soils in North Dakota SF-1084, dated November 1994). Table 5 in the North Dakota document shows 100% relative yield for pinto beans at an

electrical conductivity of a saturated paste of 2,000 µS/cm. The threshold for salinity in Table 5 does not agree, however, with the lower threshold of about 1,000 µS/cm shown in Figure 7 of the same document. In addition, the original report cited in the North Dakota document, used in support of both Figure 7 and Table 5 does not provide any data about pinto beans, or any other variety of beans, nor does it discuss threshold salinity.

Dr. Bauder, Professor of Soil and Water Quality, Montana State University, has confirmed that the genus/species of the pinto beans grown along the Tongue River is Phaseolus vulgaris L, which is identified in salt tolerance tables as Bean, common. According to these tables, the common bean has a threshold salinity of 1,000 µS/cm. This value is the basis for the EC standard for the Tongue River in Montana.

COMMENT NO. 33: The basis for the assumed leaching fraction of 15% for conventional irrigation is not documented.

RESPONSE: The authors of the standard references on salinity and irrigation have concluded, based on their professional judgement, that it is reasonable to assume that conventional irrigation results in a leaching fraction of 15% to 20%. In addition, a study in California was done where the leaching fractions were measured in nine fields from 1977 through 1981. The soil textures in these fields varied from very fine sand to silty clay. Crops included barley, alfalfa, wheat, sugarbeets, cotton, sorghum, bermuda grass, lettuce and cantaloupe. The leaching fractions by crop ranged from 0.02 to 0.42, and the leaching fraction by field ranged from 0.07 to 0.27. The Board believes that 15% to 20% is a good approximation of the average leaching fraction that is occurring in the Tongue River Basin.

COMMENT NO. 34: The proposed EC and SAR standards for the Powder River will allow increases that will negatively impact people who use water from the Buffalo Rapids Irrigation District to irrigate crops and their yards, and those who use this water for domestic purposes.

RESPONSE: The Board disagrees. The mean values of EC and SAR in the Powder River at Locate (the nearest point for which we have data) for the period from 1990 through 2000 are about 1800 µS/cm and 4 respectively. The standards that are being adopting for the irrigation season are 2000 µS/cm and 5 respectively. Any increase allowed by the standards will not have any measurable effect on Buffalo Rapids Irrigation District water users.

COMMENT NO. 35: Any increase in the concentration of sodium will hasten the inevitable destruction of the irrigated soils. There is no flushing of these soils because the water quality is not sufficient to take out the salts that have accumulated since irrigation began. The irrigators probably are not aware that the accumulation of salt in the soils is not going to get better. Even if water from CBM wells is not

discharged into the Tongue River, there will continue to be accumulations of sodium in the soil because all the water being used for irrigation contains it.

RESPONSE: The Board disagrees that flushing of salt from the soils does not occur. According to the comment, irrigation along the Tongue River near Miles City would cause toxic concentrations in the soil (nothing would grow) in about 15 years if no leaching is taking place. For the Powder River, with a mean salinity of about 1800 µS/cm, it would only require five years to achieve toxic levels in the soil if no leaching occurs. However, irrigation has been underway in these areas for nearly 100 years. Based upon the historic use of irrigation waters in this area, adequate leaching has and is occurring in the irrigated lands of the Tongue and Powder River Valleys. The proposed water quality standards will allow successful irrigation indefinitely, provided the current leaching fractions are maintained.

Sodium levels in the soils naturally fluctuate in response to drought and changes in management. Consequently, one should expect the sodium levels in the soils now to be higher than they were a few years ago before the current drought started.

COMMENT NO. 36: The water quality standards for the tributaries should be higher in the nonirrigation season similar to the standards for the Tongue and Powder Rivers. Moreover, the standards should be established at different levels for ephemeral tributaries as opposed to perennial tributaries.

RESPONSE: The Board disagrees that the standards for the tributaries should be different for perennial and ephemeral streams because the characteristics of ephemeral and perennial streams are intermixed in the tributaries within the Basin. That is, many streams have some sections that are perennial and other sections that are ephemeral. Water that is discharged into a section of a tributary that is perennial, for example, is likely to flow into another section of the stream that is ephemeral. In addition, much of the water discharged during the nonirrigation season is likely to be "stored" as ice and flow downstream during the irrigation season. For this reason, the Board does not agree that the standards for tributaries should be higher in the nonirrigation season.

COMMENT NO. 37: The proposed standards of the Department are too high. Only the "compromise standards" developed by the irrigators will protect all uses.

RESPONSE: The Board disagrees. The standards being adopted have been modified in some respects from those that were originally proposed by the Department. The major changes include lowering the nonirrigation season standards for the Tongue River Reservoir, lowering the SAR standards for the Tributaries and the adoption of maximum or "instantaneous" standards. As a result, the standards being adopted are

similar to the proposed "compromise standards" of the irrigators.

As Dr. Bauder explained, small differences in the standards, such as the difference between a SAR standard of 3 and a standard of 3.5, are not significant in terms of protecting uses. The Board believes that the standards being adopted are based on a sound rationale that will protect uses.

COMMENT NO. 38: Flow-based permitting should only be allowed during the nonirrigation season.

RESPONSE: The Board disagrees. The flows are usually so low during the nonirrigation season that very little water could be discharged regardless of what flows are used to calculate discharge limits. Thus, adoption of flow based standards for use only during the nonirrigation season would serve little purpose.

See response to Comment No. 43.

COMMENT NO. 39: CBM development will increase the sodium content of the Yellowstone River to the point that communities such as Glendive will have to remove sodium from their drinking water.

RESPONSE: The Board disagrees. Given that 50% of the time the flow of the Yellowstone at Sidney is above 7,500 cubic feet per second and the average sodium concentration is about 60 micrograms per liter (mg/L). If we assume that 50,000 CBM wells were each discharging 2.5 gallons per minute at a given time (which is very unlikely) at an average concentration of 400 mg/L the resulting sodium concentration in the Yellowstone River would be increased to 78 mg/L. This concentration is well below the level that would cause any problems. Thus, treatment would not be required.

COMMENT NO. 40: The Department's proposed standards are so high that more efficient sprinkler irrigation, which usually achieves leaching fractions less than 15%, will not be possible without damage to irrigated land.

RESPONSE: The Board disagrees. The Department's proposed standards would allow relatively small increases in the EC and SAR of the water used in the Lower Tongue River Valley and practically immeasurable increases in the Yellowstone Valley. In the Tongue River Valley, the increases would result in water quality similar to the upper levels of EC and SAR that occur in river waters used by farmers in the Tongue River Drainage. Irrigation waters with similar or poorer quality have been used successfully in other irrigated regions of the west. The changes are so small that no changes in management of sprinkler irrigation systems will be necessary. If it is practical to sprinkler irrigate a particular field now, it will still be practical after the increases allowed by the standards occurs.

COMMENT NO. 41: A field in the Tongue River Valley near Miles City has recently shown spots where salt is accumulating

after about 100 years of successful irrigation. This is partially due to CBM discharges and partially due to the drought. The problem will become worse if the proposed standards are adopted.

RESPONSE: Since there is no data to support the theory that CBM discharges have caused any measurable changes in the quality of the lower Tongue River, the Board cannot determine whether CBM discharges have contributed to the problem of this irrigator. However, the standards being adopted by the Board will protect irrigated land from any new proposals to discharge CBM water in the Tongue River.

COMMENT NO. 42: Under state and federal law, the proposed water quality standards must protect designated uses and allow no degradation of existing uses. The evidence submitted by Montana FWP indicates that the proposed water quality standards do not protect warm water fisheries. In addition, the evidence provided by Drs. Bauder and Munn indicate that the proposed standards do not protect soils and irrigated crops under all circumstances. Finally, the proposed standards violate the nondegradation requirements, because they allow as much as a 200% increase over current salinity in the Tongue River. Since the proposed standards do not protect designated uses in all circumstances, those standards violate the federal CWA and implementing regulations and Montana's Water Quality Act.

RESPONSE: As indicated in the responses, the Board has modified the proposed standards in response to the comments of FWP regarding zooplankton in the Tongue River Reservoir by adopting a year-round average monthly standard for EC at 1000 µS/cm for the Tongue River Reservoir. The Board has also modified the nonirrigation season standard for EC on the Tongue River and Rosebud Creek.

Dr. Bauder's concern is that standards based on mean monthly values do not limit spikes in the parameters. He contends that such spikes, or relatively short-term high values, could be harmful to irrigation uses. The Board has addressed this issue by adopting both mean monthly and maximum standards.

Dr. Munn shares Dr. Bauder's concern and in addition feels that flow based standards will not be protective because of the wide natural fluctuations in flows. This concern is addressed in the response to Comment No. 43.

Finally, although the rules allow salinity increases above background of as much as 200% under the nondegradation provision and numeric standards, this would only occur during the nonirrigation season. During the irrigation season, the nondegradation provisions and numeric standards closely reflect existing quality in the lower Tongue River and, consequently, prohibit any significant increase over background levels caused by CBM discharges.

As stated in the proposed notice of rulemaking, the nondegradation provision was established in recognition that significant increases of salinity levels occur throughout the

year due to natural fluctuations of EC in the River. Since these fluctuations occur naturally, adopting a nondegradation requirement that allows only a de minimis change above existing quality will not prevent natural fluctuations of EC from going far beyond the de minimis value. Regardless, the nondegradation provision being adopted will maintain all designated and existing uses in compliance with state and federal law.

COMMENT NO. 43: The proposed standards do not protect designated uses because the provisions for flow-based permitting do not ensure that designated uses are protected at all times. For example, no standard is set that addresses worst-case, low-flow events, and the rule is silent on the way the flow-based permit will be monitored and measured. The fact that occasional high flows in the Tongue River may render discharges of CBM water less harmful is not a reason to allow year-round flow-based discharges. Finally, it is arbitrary to abandon the current use of the 7Q10 limitation that is applied in all other MPDES permits, given the Department's reliance on the 7Q10 as an appropriate means to protect water quality. The purpose of the Montana and federal water quality laws is to protect water quality and beneficial uses, not to encourage the discharge of more pollutants. If flow-based permitting is allowed, one commentor suggested that a requirement for real-time flow meters be adopted.

RESPONSE: The Board does not agree that the requirement for a flow-based analysis to determine compliance with all applicable water quality standards will fail to protect designated uses. The language in the rule contemplates that the ultimate goal of the flow-based analysis is to ensure that water quality standards and nondegradation requirements are met. Rather than needlessly limit discharges by applying a worst-case restriction during periods of high flow, the rule requires the Department to allow more discharges during high-flow events, provided that all water quality standards and nondegradation requirements are met. Although the rule does not mandate the use of the 7Q10 or real-time flow meters, as requested by the comments, the rule does not prohibit their use. For example, the Department may determine that the 7Q10 is an appropriate limit during months that have demonstrably low-flows. Given that the Department's use of the flow-based analysis must ultimately ensure that all water quality standards are met, the rule guarantees that all beneficial uses will be fully protected.

COMMENT NO. 44: The amended rule proposed by the Department is unconstitutional on its face because it sets standards and provides for nondegradation exemptions that may allow harm to water quality and beneficial uses (i.e., agriculture, fisheries and aquatic ecosystems) without serving a compelling state interest. There is no compelling state interest in adopting standards to suit the needs of the CBM

industry, particularly when treatment and alternative disposal methods exist.

Furthermore, Montana's Constitution imposes a duty on the state and all persons to ensure that a clean and healthful environment is protected. That duty is fulfilled by adopting the irrigator's proposed standards and rejecting the Department's proposed standards.

RESPONSE: The Board disagrees. First, the Department's proposed numeric water quality standards are established at levels that will protect all of the designated and existing uses of the water, including the water's use for the support of aquatic life and agricultural purposes. Second, the Department's nonsignificance proposal does not exempt EC and SAR from nondegradation review. Rather, the Department's proposal specifies a narrative threshold for determining nonsignificance that, similar to the numeric standards, will protect existing uses by prohibiting any measurable effect on those uses.

Moreover, the Board considered and rejected the alternative of establishing a 50% or 10% nonsignificance threshold for EC and SAR similar to the proposal contained in the irrigator's petition. In MAR Notice No. 17-171, the Board explained that, given the natural fluctuations of EC and SAR in the Tongue and Powder Rivers, which often result in exceedances of the proposed numeric standards, the policy of maintaining existing "high quality" for these parameters is not justified. Regardless of the numeric threshold that could be imposed by the adoption of a 50% or 10% threshold, those thresholds will not prevent EC and SAR from naturally degrading water quality to the point where the numeric standards are exceeded. The Board also explained that imposing a numeric threshold based upon a percentage of the assimilative capacity would be virtually impossible to comply with or enforce. Given that slight changes in EC and SAR are extremely difficult to measure, a nonsignificance threshold based upon a percentage of the assimilative capacity would require continuous in-stream monitoring in order to distinguish between natural degradation and nonsignificant changes resulting from discharges. The impracticality of enforcing a numeric threshold for these parameters argues persuasively against the adoption of such thresholds.

Upon review of the data, the Board acknowledges that the rationale for adopting a narrative nondegradation threshold, because natural fluctuations of EC and SAR will often exceed the numeric standards, is not applicable to the Tongue River. However, the second reason is applicable and supports rejecting a nonsignificance threshold based upon a percentage of the assimilative capacity. As stated above, a nonsignificance threshold based upon a percentage of the assimilative capacity would be difficult to determine and enforce. Applying a de minimis threshold would require continuous instream monitoring in order to distinguish between natural increases, increases caused by seepage from newly

constructed CBM ponds, and "nonsignificant" increases caused by a new discharge.

Based on the reasons given above, the Board does not believe that the numeric standards and nonsignificance thresholds proposed by the Department violate the constitutional duty to "maintain and improve a clean and healthful environment." The standards and criteria are intended to protect and maintain all designated uses of the waters while recognizing that there is little that can be done to "improve" natural fluctuations of water quality.

COMMENT NO. 45: The Department's reason for the non-severability clause fails to establish a rational basis for striking all of the water quality protections in the proposed rules in the event that one of the provisions is declared invalid. Typically, a court will not invalidate an entire regulatory scheme if one part is declared invalid when the stricken provision is not integral to the regulation as a whole. This is particularly so when the non-severability clause will leave Montana with no protection against the pollutants being regulated under the proposed rules. For example, the flow-based provision in the rules could be declared invalid without invalidating the numeric standards themselves. On the other hand, if the court defers to a non-severability clause, then the entire rule would be stricken and, by default, the narrative standards would apply. The Department has implicitly acknowledged through the initiation of these rules that the narrative standards are inadequate. Therefore, the ultimate result of adopting a non-severability clause would be to lessen water quality protection in the event one portion of the regulation is declared invalid.

RESPONSE: In MAR Notice No. 17-187, the Board explained that the purpose of the non-severability clause is to preserve the Board's primary objective of adopting numeric standards that will protect all existing and designated uses of the waters without unnecessarily restricting discharges that will not harm those uses. The Board is concerned that, if a court invalidates the nonsignificance thresholds for EC and SAR, the result would likely be the imposition of numeric nonsignificance thresholds for these parameters under a court-ordered remedy. As explained above, the Board has considered and rejected the option of adopting numeric nonsignificance thresholds based upon the impracticality of enforcing those thresholds and the fact that the waters naturally degrade to a point that they often exceed the standards throughout any given year. For this reason, the Board is adopting the non-severability clause because without it a court might impose a threshold that is not warranted due to the natural conditions of the streams.

COMMENT NO. 46: The standards proposed by the Montana Department of Fish, Wildlife, and Parks are based on improper assumptions, limited data, and faulty methodology for the development of water quality criteria.

RESPONSE: We agree that the process used by Department of Fish, Wildlife, and Parks (FWP) to develop criteria does not meet all of the requirements set forth by EPA for criteria development. The FWP information can only be used to suggest criteria, not to define them. The Board is not relying solely on this information but feels that it supports the adoption of a year-round EC standard of 1000 µS/cm for the Tongue River Reservoir. Likewise, it supports the desire of the Board to be conservative in the adoption of a nonirrigation season EC standard of 1500 µS/cm for the Tongue River and Rosebud Creek.

COMMENT NO. 47: The Miles City station should not be considered representative of Tongue River water quality. This station is downstream from the diversion of T & Y Irrigation District and consequently has less flow and higher SARs during the irrigation season. The Brandenberg Bridge station provides a more representative measurement of water quality than the Miles City station.

RESPONSE: We recognize that there may be changes in the water quality of the Tongue River from the Brandenberg Bridge station to the Miles City station. Pumpkin Creek enters the Tongue River below the T & Y diversion and at the mouth of Pumpkin Creek during the irrigation season it had an average EC of 2094 µS/cm (64 samples) and an average SAR of 9.6 (42 samples) during the 1970s and 1980s. The actual sources of the changes in the quality of the Tongue River in this reach will be addressed during the development of a TMDL.

COMMENT NO. 48: The standards might require clean up of ranch reservoirs.

RESPONSE: Existing ranch reservoirs/ponds are not regulated by this proposed rulemaking.

COMMENT NO. 49: The numeric standards are more stringent than narrative federal standards.

RESPONSE: Both the numeric standards and narrative standards are intended to protect beneficial uses. The state is adopting numeric standards, not because they are more stringent, but because they are easier to administer and enforce.

COMMENT NO. 50: The flow-based approach is impractical. Using this approach will make it difficult to develop discharge limitations and to monitor compliance with those limitations.

RESPONSE: We agree that using the flow-based approach will make it more difficult to develop discharge limitations and to monitor compliance with those limitations. This does not mean that this approach is impractical. DEQ is using this approach in some permits now. The Board believes that DEQ is competent to administer the flow-based approach.

COMMENT NO. 51: Many commentors urged the Board to adopt strict numeric standards for EC and SAR. Other commentors

urged the Board to adopt more liberal numeric standards in the absence of proof that such liberal standards would actually cause harm to beneficial uses.

RESPONSE: The adoption of numeric standards for EC and SAR involves an assessment of risks to beneficial uses. The Board is adopting numeric standards that provide a high level of confidence that the standards protect beneficial uses, as supported by scientific studies of the effects on crops and soils. By adopting standards that are within the range of levels of EC and SAR that occur naturally in the streams in the Powder River Basin, the Board believes that the effects on aquatic life and riparian vegetation will be minimal. The Board is not required to adopt a liberal numeric standard because of the lack of definite scientific studies that such a liberal standard will not harm beneficial uses.

Reviewed by: BOARD OF ENVIRONMENTAL REVIEW

John F. North By: *Joseph W. Russell*
JOHN F NORTH JOSEPH W. RUSSELL, M.P.H.
Rule Reviewer Chairman

Certified to the Secretary of State, April 14, 2003.